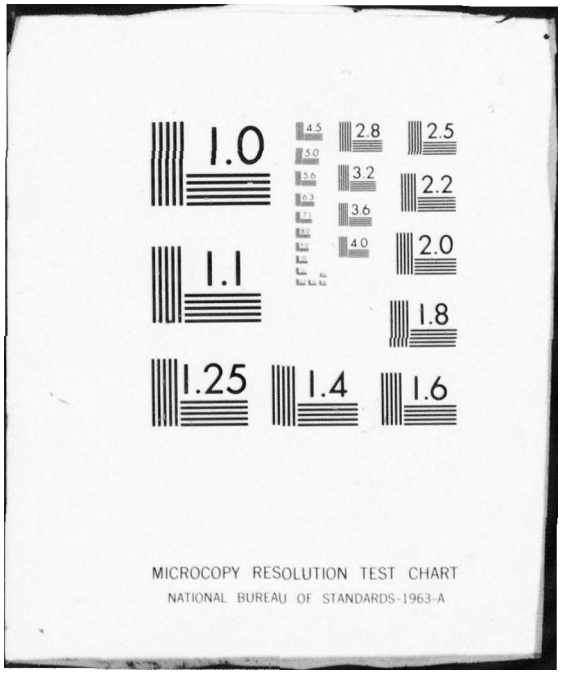
AD-A083 798 STANFORD UNIV CA DEPT OF PSYCHOLOGY F/G 5/10
THE FRAMING OF DECISIONS AND THE RATIONALITY OF CHOICE.(U)
APR 80 A TVERSKY, D KAHNEMAN N00014-79-C-0077
UNCLASSIFIED TR-2 NL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LEVEL II

The Framing of Decisions and the Rationality of Choice

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March 1980

Preparation of this report was supported by the
Engineering Psychology Programs, Office of Naval Research

ONR Contract N00014-79-c-0077 Work Unit NR197-058

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: Technical Report No. 2
2. GOVT ACCESSION NO.: AD-A083 798
3. RECIPIENT'S CATALOG NUMBER:
4. TITLE *(and Subtitle)*: The Framing of Decisions and the Rationality of Choice.
5. TYPE OF REPORT & PERIOD COVERED: Technical Report. Jan 1979 — Mar 1980
6. PERFORMING ORG. REPORT NUMBER:
7. AUTHOR(s): Amos Tversky and Daniel Kahneman
8. CONTRACT OR GRANT NUMBER(s): N00014-79-C-0077
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Stanford University, Department of Psychology, Stanford, California 94305
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: NR 197-058
11. CONTROLLING OFFICE NAME AND ADDRESS: Engineering Psychology Programs, Office of Naval Research - Code 455, Arlington, Virginia 22217
12. REPORT DATE: 1 April 1980
13. NUMBER OF PAGES: 28
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*:
15. SECURITY CLASS. *(of this report)*:
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE:
16. DISTRIBUTION STATEMENT *(of this Report)*: Approved for public release; distribution unlimited
17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*: TR-2
18. SUPPLEMENTARY NOTES:
19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*: Decision Making, Rationality, Risk, Protective Action
20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*:

The psychological principles that govern individual decision making produce predictable reversals of preferences when the same decision problem is framed in different ways. Inconsistencies are illustrated in choices involving monetary outcomes, both hypothetical and real, and in policy quesions that pertain to the loss of human lives. Our analysis questions the descriptive adequacy of the standard rational model and highlights the dependence of the normative theory of choice on the psychology of hedonic experience.

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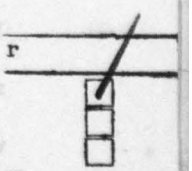
Explanations and predictions of people's choices, in everyday life as well as in the social sciences, are often founded on the assumption of human rationality. The definition of rationality has been much debated, but there is general agreement that rational choices should reflect a coherent evaluation of the anticipated consequences of actions and of the probabilities of these consequences (1). In the present paper we describe decision problems in which people systematically violate elementary requirements of consistency and coherence and we trace these violations of rationality to the psychological principles that govern the perception of decision problems and the evaluation of options.

A decision problem is defined by the acts or options among which one must choose, the possible outcomes or consequences of these acts, and the contingencies or conditional probabilities that relate outcomes to acts. We use the term "decision frame" to refer to the decision maker's conception of the acts, outcomes and contingencies associated with a particular choice.

It is often possible to represent a given decision problem in more than one way. Alternative frames for a decision problem may be compared to alternative perspectives on the same scene. Veridical perception requires that the perceived relative height of two neighboring mountains, say, should not reverse with changes of vantage point. Similarily, rational choice requires that the preference between options should not reverse with changes of frame. Because of imperfections of human perception and decision, however, changes of perspective often reverse the relative apparent size of objects and the relative desirability of options.



The present paper describes selected illustrations of a series of preference reversals produced by variations in the framing of acts, contingencies and outcomes. These effects have been confirmed in the choices of different groups of respondents including undergraduate students, University faculty and physicians. The data reported in this paper were obtained from students at Stanford University and at the University of British Columbia, who answered brief questionnaires in a classroom setting. The total number of respondents for each problem is denoted by N, and the percentage who chose each option is indicated in parentheses.

The effects of variations in framing is illustrated in Problems 1 and 2.

Problem 1 (N = 158): Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the consequences of the programs are as follows:

If Program A is adopted, 200 people will be saved. (76%)

If Program B is adopted, there is 1/3 probability that 600 people will be saved, and 2/3 probability that no people will be saved. (24%)

Which of the two programs would you favor?

The majority choice in this problem is risk averse: the prospect of certainly saving 200 lives is more attractive than a risky prospect of equal expected value, i.e., one chance in three to save 600 lives.

A second group of respondents received the cover story of Problem 1 and a different formulation of the alternative programs, as follows.

Problem 2 (N = 169):

If Program C is adopted 400 people will die. (13%)

If Program D is adopted there is 1/3 probability that nobody will die, and 2/3 probability that 600 people will die. (87%)

Which of the two programs would you favor?

The majority choice in Problem 2 is risk seeking: the prospect of 400 people certainly dying is less acceptable than two chances in three of a loss of 600 lives. The preferences in Problems 1 and 2 illustrate a common pattern: choices involving gains are often risk averse while choices involving losses are often risk seeking. However, it is easy to see that Problems 1 and 2 are in fact identical. The only difference between them is that the outcomes are described in Problem 2 by the number of lives lost, and in Problem 1 by the number of lives saved relative to an anticipated loss of 600 lives. The change in the description of the outcomes, from lives saved to lives lost, is accompanied by a pronounced shift from risk aversion to risk seeking. We have observed this reversal in several groups of respondents, including University faculty and physicians. The inconsistent responses to Problem 1 and 2 arise from the conjunction of a framing effect with contradictory attitudes to risks involving gains and losses. We turn now to an analysis of these attitudes to risk.

THE EVALUATION OF PROSPECTS

The major theory of decision making under risk is the expected utility model, which rests on a set of axioms of rational choice. The theory associates

numerical utilities to outcomes and describes the choice between options as a maximization of expected utility, obtained by weighting the utilities of possible outcomes by their respective probabilities (1).

As will be illustrated below, people exhibit patterns of preference which appear incompatible with expected utility theory. We have presented elsewhere (2) a descriptive model, called prospect theory, which modifies expected utility theory so as to accommodate these observations. We distinguish two phases in the choice process: an initial phase in which acts, outcomes and contingencies are framed, and a subsequent phase of evaluation (3). For simplicity, we restrict the formal treatment of the theory to choices involving stated numerical probabilities and quantitative outcomes, such as money, time or number of lives.

Consider a prospect that yields outcome x with probability p, outcome y with probability q, and the status quo with probability 1-p-q. According to prospect theory, there are values v(.) associated with outcomes, and decision weights π(.) associated with probabilities, such that the overall value of the prospect equals $\pi(p)\, v(x) + \pi(q)\, v(y)$. A slightly different equation should be applied if all outcomes of a prospect are on the same side of the zero point (4).

In prospect theory, outcomes are expressed as positive or negative deviations (gains or losses) from a neutral reference outcome, which is assigned a value of zero. Although subjective values differ among individuals and attributes, we propose that the value function is commonly S-shaped, concave above the reference point and convex below it, as illustrated in Figure 1. For example, the difference in subjective value between gains of $10 and $20 is

greater than the subjective difference between gains of $110 and $120. The same relation between value-differences holds for the corresponding losses. Another property of the value function is that the response to losses is more extreme than the response to gains. The aggravation of losing a sum of money is generally greater than the pleasure associated with winning the same amount, as is reflected in people's reluctance to accept fair bets on a toss of a coin. These properties of the value function have been confirmed in several studies of decision (2, 5, 6) and judgment (7).

Insert Figures 1 and 2 here

The second major departure of *prospect* theory from the expected utility model involves the treatment of probabilities. In expected utility theory, the utility of an uncertain outcome is weighted by its probability, while in prospect theory the value of an uncertain outcome is multiplied by a decision weight $\pi(p)$, which is a monotonic function of p but is not a probability. The weighting function π has the following properties. First, impossible events are discarded, i.e., $\pi(0) = 0$, and the scale is normalized so that $\pi(1) = 1$, but the function is not well-behaved near the endpoints. Second, for low probabilities $\pi(p) > p$, but $\pi(p) + \pi(1 - p) < 1$. Thus low probabilities are overweighted, moderate and high probabilities are underweighted, and the latter effect is more pronounced than the former. Third, $\pi(pq)/\pi(p) < \pi(pqr)/\pi(pr)$ for all $0 < p, q, r \leq 1$. That is, for any fixed probability ratio q, the ra io of decision weights is closer to unity when the probabilities are low than when they are high, e.g., $\pi(.1)/\pi(.2) > \pi(.4)/\pi(.8)$. A hypothetical weighting function which satisfies these properties is shown in Figure 2. The major qualitative

properties of decision weights can be extended to cases in which the probabilities of outcomes are subjectively assessed rather than explicitly given. In these situations, however, decision weights may also be affected by other characteristics of an event, such as ambiguity or vagueness (8).

Prospect theory, and the scales illustrated in Figures 1 and 2 should be viewed as an approximate, incomplete and simplified description of the evaluation of risky prospects. Although the properties of v and π summarize a common pattern of choice, they are not universal: the preferences of some individuals are not well described by an S-shaped value function and a consistent set of decision weights. The simultaneous measurement of values and decision weights presents serious experimental and statistical difficulties (9).

If π and v were linear throughout, the preference order between options would be independent of the framing of acts, outcomes, or contingencies. Because of the characteristic non-linearities of π and v, however, different frames can lead to different choices. The following three sections describe reversals of preference caused by variations in the framing of acts, contingencies and outcomes.

THE FRAMING OF ACTS

Problem 3 (N = 150): Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer.

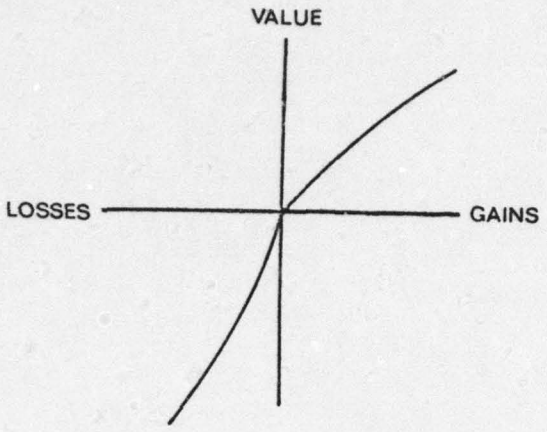


Figure 1: A hypothetical value function.

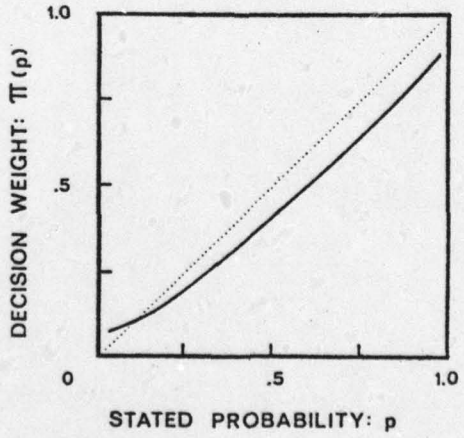


Figure 2: A hypothetical weighting function.

Decision (i) Choose between:
A. a sure gain of $240 (84%)
B. 25% chance to gain $1000, and
75% chance to gain nothing (16%)

Decision (ii) Choose between:
C. a sure loss of $750 (13%)
D. 75% chance to lose $1000, and
25% chance to lose nothing (87%)

The modal choice in Decision (i) is risk averse: a riskless prospect is preferred to a risky prospect of equal or greater expected value. In contrast, the majority choice in Decision (ii) is risk seeking: a risky prospect is preferred to a riskless prospect of equal expected value. This pattern of risk aversion in choices involving gains and risk seeking in choices involving losses is attributable to the properties of v and π. Because the value function is S-shaped, the positive value associated with a gain of $240 is greater than 24% of the value associated with a gain of $1000, and the negative value associated with a loss of $750 is greater than 75% of the value associated with a loss of $1000. Thus, the shape of the value function contributes to risk aversion in Decision (i) and to risk seeking in Decision (ii). Moreover, the underweighting of moderate and high probabilities contributes to the relative attractiveness of the sure gain in (i) and to the relative aversiveness of the sure loss in (ii). The same analysis also applies to Problems 1 and 2.

Because (i) and (ii) were presented together, the participants in fact had to choose one prospect from the set: A & C, B & C, A & D, B & D. The most common pattern (A & D) was chosen by 73% of respondents, while the least popular pattern (B & C) was chosen by only 3% of respondents. However, the combination of B & C actually dominates the combination of A & D, as is readily seen in Problem 4.

Problem 4: (N = 86) Choose between:

A & D. 25% chance to win $240, and
75% chance to lose $760. (0%)

B & C. 25% chance to win $250, and
75% chance to lose $750. (100%)

When the prospects were combined and the relation of dominance was made transparent, all respondents chose the dominant option. Hence, the violation of dominance in Problem 3 indicates that this problem was framed as a pair of separate choices. The respondents apparently failed to entertain the possibility that the conjunction of two seemingly reasonable choices could lead to an untenable result.

The violations of dominance observed in Problem 3 do not disappear in the presence of monetary incentives. A different group of respondents who answered a modified version of Problem 3, with real payoffs, produced the same pattern of choices (10). Other studies have also reported that violations of the rules of rational choice, originally observed in hypothetical questions, were not eliminated by payoffs (11).

We suspect that many concurrent decisions in the real world are framed independently, and that the preference order would often be reversed if the decisions were combined. The respondents in Problem 3 failed to combine options, although the integration was relatively simple and was encouraged by instructions (12). The complexity of practical problems of concurrent decisions, such as portfolio selection, would not allow people to integrate options without computational aids, even if they were inclined to do so.

THE FRAMING OF CONTINGENCIES

The following triple of problems illustrates the framing of contingencies. Each problem was presented to a different group of respondents, who were informed that one participant in ten, preselected at random, would actually play the prospect of his or her choice. Chance events were realized, in the respondents presence, by drawing a single ball from a bag containing a known proportion of balls of the winning color, and the winners were paid immediately.

Problem 5 (N = 77): Which of the following options do you prefer?

A. a sure win of $30 (78%)
B. 80% chance to win $45. (22%)

Problem 6 (N = 85): Consider the following two stage game. In the first stage, there is a 75% chance to end the game without winning anything, and a 25% chance to move into the second stage. If you reach the second stage you have a choice between:

C. a sure win of $30. (74%)
D. 80% chance to win $45. (26%)

Your choice must be made before the game starts, i.e., before the outcome of the first stage is known. Please indicate the option you prefer.

Problem 7 (N = 81): Which of the following options do you prefer?

E. 25% chance to win $30. (42%)
F. 20% chance to win $45. (58%)

Let us examine the structure of these problems. First, note that Problems 6 and 7 are identical in terms of probabilities and outcomes, because prospect C

offers a .25 chance to win \$30, while prospect D offers a probability of .25 x .80 = .20 to win \$45. Consistency therefore requires that the same choice be made in Problems 6 and 7. Second, note that Problem 6 differs from Problem 5 only by the introduction of a preliminary stage. If the second stage of the game is reached, then Problem 6 reduces to Problem 5; if the game ends at the first stage, the decision does not affect the outcome. Hence, there seems to be no reason to make a different choice in Problems 5 and 6. By this logical analysis, Problem 6 is equivalent to Problem 7 on the one hand, and to Problem 5 on the other. The participants, however, responded similarly to Problems 5 and 6, but distinguished both from Problem 7. This pattern of responses exhibits two phenomena of choice: the certainty effect, and the pseudo-certainty effect.

The contrast between Problems 5 and 7 illustrates a phenomenon discovered by Allais (13), which we have labeled the certainty effect: a reduction of the probability of an outcome by a constant factor has more impact when the outcome was initially certain than when it was merely probable. Prospect theory attributes this effect to the properties of π. It is easy to verify, by applying the equation of prospect theory to Problems 5 and 7, that people for whom the value ratio $v(30)/v(45)$ lies between the weight ratios $\pi(.20)/\pi(.25)$ and $\pi(.80)/\pi(1.0)$ will prefer A to B and F to E, contrary to expected utility theory. Note that prospect theory does not predict a reversal of preference for every individual in Problems 5 and 7. It only requires that an individual who is indifferent between A and B prefer F over E. For group data, the theory predicts the observed directional shift of preference between the two problems.

The first stage of Problem 6 yields the same outcome (no gain) for both acts. Consequently, we propose, people evaluate the options conditionally, as

if the second stage had been reached. In this framing, of course, Problem 6 reduces to Problem 5. More generally, we suggest that a decision problem is evaluated conditionally when (i) there exists an event which yields the same outcome for all acts, e.g., failing to reach the second stage of the game in Problem 6; (ii) the stated probabilities of other outcomes are conditional on the complement of this event.

The striking discrepancy between the responses to Problems 6 and 7, which are identical in outcomes and probabilities, could be described as a pseudo-certainty effect. The prospect yielding $30 is relatively more attractive in Problem 6 than in Problem 7, as if it had the advantage of certainty. The sense of certainty associated with option C is illusory, however, since the gain is in fact contingent on reaching the second stage of the game (14).

We have observed the certainty effect in several sets of problems, with outcomes ranging from vacation trips to the loss of human lives. In the negative domain, certainty exaggerates the aversiveness of losses that are certain relative to losses that are merely probable. In a question dealing with the response to an epidemic, for example, most respondents found "a sure loss of 75 lives" more aversive than "80% chance to lose 100 lives", but preferred "10% chance to lose 75 lives" over "8% chance to lose 100 lives", contrary to expected utility theory.

We also obtained the pseudo-certainty effect in several studies, where the description of the decision problems favored conditional evaluation. Pseudo-certainty can be induced either by a sequential formulation, as in Problem 6, or by the introduction of causal contingencies. In another version of the epidemic

problem, for instance, respondents were told that risk to life existed only in the event (probability .10) of the disease being carried by a particular virus. Two alternative programs were said to yield "a sure loss of 75 lives" or "80% chance to lose 100 lives" if that virus was involved, and no loss of life if the disease was carried by another virus. The introduction of this decision-irrelevant state did not affect preferences, which were the same as when the contingent loss of 75 lives was actually certain. Note that the certainty effect reveals attitudes toward risk that are inconsistent with the axioms of rational choice, while the pseudo-certainty effect violates the more fundamental requirement that preferences should be independent of problem description.

Many significant decisions concern actions which reduce or eliminate the probability of a hazard, at some cost. The shape of π in the range of low probabilities suggests that a protective action which reduces the probability of a harm from 1% to zero, say, is more valuable than an action which reduces the probability of the same harm from 2% to 1%. Indeed, probabilistic insurance, which halves the probability of a hazard, is judged to be worth less than half the price of regular insurance, which eliminates the risk altogether (2).

It is often possible to frame protective action in either conditional or unconditional form. For example, an insurance policy that covers fire but not flood could be evaluated either as full protection against the specific risk of fire or as a reduction in the overall probability of property loss. The preceding analysis suggests that insurance should appear more attractive when it is presented as the elimination of risk than when it is described as a reduction of risk. Relevant evidence was obtained by Slovic, Fischhoff and Lichtenstein, in an unpublished study. They found that a hypothetical vaccine which reduces

the probability of contracting a disease from .20 to .10 is less attractive if it is described as effective in half the cases than if it is presented as fully effective against one of two (exclusive and equiprobable) virus strains, which produce identical symptoms. In accord with the present analysis of pseudo-certainty, the respondents valued full protection against an identified virus more than probabilistic protection against the disease.

The preceding discussion highlights the sharp contrast in lay responses to the reduction and to the elimination of risk. Because no form of protective action can cover all risks to human welfare, all insurance is essentially probabilistic: it reduces but does not eliminate risk. The probabilistic nature of insurance is commonly masked by formulations which emphasize the completeness of protection against identified harms, but the sense of security that such formulations provide is an illusion of conditional framing. It is not easy to determine whether people value the elimination of risk too much, or the reduction of risk too little. The contrasting attitudes to the two forms of protective action, however, are incompatible with the standard normative analysis. They suggest that insurance is bought as a protection against worry, not only against risk, and that worry can be manipulated by the labeling of outcomes and the framing of contingencies (15).

THE FRAMING OF OUTCOMES

Outcomes are commonly perceived as positive or negative in relation to a reference outcome which is judged neutral. Variations of the reference point

can therefore determine whether a given outcome is evaluated as a gain or as a loss. Because the value function is generally concave for gains, convex for losses, and steeper for losses than for gains, shifts of reference can change the value difference between outcomes and thereby reverse the preference order between options. Problems 1 and 2 illustrated a preference reversal, induced by a shift of reference that transformed gains into losses.

The coding of a particular option as a normal reference, to which other options are compared, could also affect preferences. Because the value function is steeper for losses than for gains, a difference between options will loom larger when it is framed as a disadvantage of one option, rather than as an advantage of the other option. An interesting example of such an effect has been noted by Thaler (16). In a debate on a proposal to pass to the consumer some of the costs associated with the processing of credit-card purchases, representatives of the credit-card industry requested that the price difference be labeled a cash discount rather than a credit-card surcharge. The two labels induce different reference points, by implicitly designating as normal the higher or the lower of the two prices. Because losses loom larger than gains, consumers are less willing to accept a surcharge than to forego a discount.

The present treatment highlights the lability of reference outcomes, as well as their role in decision making. In the examples discussed so far, the neutral reference point was identified by the labeling of outcomes. A diversity of factors determine the reference outcome in everyday life. The reference outcome is ususally a state to which one has adopted; it is sometimes set by social norms and expectations; it sometimes corresponds to a level of aspiration, which may or may not be realistic.

We have dealt so far with elementary outcomes, such as gains or losses in a single attribute. In many situations, however, an action gives rise to a compound outcome, which joins a series of changes in a single attribute, e.g., a sequence of monetary gains and losses, or a set of concurrent changes in several attributes. To describe the framing and evaluation of compound outcomes, we adopt Thaler's notion of psychological accounting (16). In our usage, a psychological account is an outcome frame which specifies (i) the set of elementary outcomes that are evaluated jointly and the manner in which they are combined; (ii) a reference outcome that is considered neutral or normal. In the account that is set up for the purchase of a car, for example, the cost of the purchase is not treated as a loss, nor is the car viewed as a gift. Rather, the transaction as a whole is evaluated as positive, negative or neutral, depending on such factors as the performance of the car and the price of similar cars in the market.

We propose that people generally evaluate acts in terms of a minimal account, which includes only the direct consequences of the act. Thus, the minimal account associated with the decision to accept a gamble is restricted to the money won or lost in that gamble. People tend to adopt minimal accounts because this mode of framing (i) simplifies evaluation and reduces cognitive strain; (ii) reflects the intuition that consequences should be causally linked to acts; (iii) matches the properties of hedonic experience, which is more sensitive to desirable and undesirable changes than to steady states.

There are situations , however, in which the outcomes of an act affect the balance in an account that was previously set up by a related act. In these

cases, the decision at hand may be evaluated in terms of a more inclusive account. Because of the non-linearities of the evaluation process, the minimal account and a more inclusive one can lead to different choices (17). The effect of an existing account on a decision is illustrated in Problems 8 and 9:

> Problem 8 (N = 183): Imagine that you have decided to see a play where admission is $10 per ticket. As you enter the theater you discover that you have lost a $10 bill.
>
> Would you still pay $10 for a ticket for the play?
>
> Yes (88%) No (12%)

> Problem 9 (N = 200): Imagine that you have decided to see a play and paid the admission price of $10 per ticket. As you enter the theater you discover that you have lost the ticket. The seat was not marked and the ticket cannot be recovered.
>
> Would you pay $10 for another ticket?
>
> Yes (46%) No (54%)

The marked difference between the responses to Problems 8 and 9 is an effect of psychological accounting. We propose that the purchase of a new ticket in Problem 9 is entered in the account that was set up by the purchase of the original ticket. In terms of this account, the cost of the show would be $20, a price which many of our respondents apparently found excessive. In problem 8, on the other hand, the loss of $10 is not linked specifically to the ticket purchase and its effect on the decision is accordingly slight.

The following problem, based on examples by L. J. Savage (18) and R. Thaler (16) further illustrates the effect of embedding an option in different

accounts. Two versions of this problem were presented to different groups of subjects. One group (N = 93) received the first of the two values in each pair below, while the other group (N = 88) were given the values shown in parentheses.

> Problem 10: Imagine that you are about to purchase a jacket for $125 ($15), and a calculator for $15 ($125). The calculator salesman informs you that the calculator you wish to buy is on sale for $10 ($120) at the other branch of the store, located 20 minutes drive away. Would you make the trip to the other store?

The responses to the two versions of Problem 10 were markedly different: 68% of the respondents were willing to make an extra trip to save $5 on a $15 calculator, while only 29% were willing to exert the same amount of effort when the calculator's price was $125. Evidently, the respondents do not frame Problem 10 in the minimal account, which involves only a benefit of $5 and a cost of some inconvenience. Instead, they evaluate the potential saving in a more inclusive account, which includes the purchase of the calculator , but not of the jacket. By the curvature of v, therefore, a discount of $5 has a greater impact when the calculator's price is low than when it is high.

A closely related observation has been reported by Pratt, Wise and Zeckhauser (19) who found that the variability of the prices at which a given product is sold by different stores is roughly proportional to the mean price of that product. Specifically, a ratio of 2:1 in the mean price of two products is associated with a ratio of 1.86:1 in the standard deviation of the respective quoted prices. If the effort that consumers exert to save each dollar on a

purchase were independent of price, the dispersion of quoted prices should be the same for all products. In contrast, the data of Pratt et. al (19) are consistent with the hypothesis that consumers hardly exert more effort to save $15 on a $150 purchase than to save $5 on a $50 purchase (16). Many readers will recognize the temporary devaluation of money which facilitates extra spending and reduces the significance of small discounts in the context of a large expenditure, such as buying a house or car. This paradoxical variation in the value of money is incompatible with the standard analysis of consumer behavior.

DISCUSSION

This paper has presented a series of demonstrations in which seemingly inconsequential changes in the formulation of choice problems caused significant shifts of preference. The inconsistencies were traced to the interaction of two sets of factors: variations in the framing of acts, contingencies and outcomes, and the characteristic non-linearities of values and decision weights. The demonstrated effects are large and systematic, although by no means universal. They occur when the outcomes concern the loss of human lives as well as in choices about money; they are not restriced to hypothetical questions and are not eliminated by monetary incentives. The violations of rationality described in the preceding sections resemble the effects of changing perspective on perceptual appearance more than they resemble computational errors. Framing effects, like perceptual illusions, often remain appealing even when they are recognized as mistakes. People who realize that they have made inconsistent

choices generally wish to resolve the conflict but often find no easy way to do so (20).

The metaphor of changing perspective can be used to describe other phenomena of choice, besides the framing effects with which this paper was concerned. In particular, intertemporal conflict is naturally construed in these terms. Several authors have been intrigued by Ulysses' request to be bound to the mast in anticipation of the irresistible temptation of the Sirens' call (21). In this example of precommitment, an action taken in the present renders inoperative an anticipated future preference. An unusual feature of intertemporal conflict is that the agent views a problem from a particular temporal perspective but is also aware of the conflicting views that future perspectives will offer. In contrast, one is not normally aware of the possibility that different decision frames could alter one's preferences.

The analogy between inconsistencies of choice and perceptual errors suggests that the former, like the latter, should not be described as pathological occurrences, or dismissed as random failures of an essentially unbiased measurement device. The incoherence of choices and of judgments is inherent in the rules that govern preferences and impressions (22). To the contrary, it could be argued that violations of rationality only occur when the computational cost of coherence exceeds its expected benefit. In this view, rationality should prevail when the stakes are high, but the study of history and the analysis of political decisions provide little evidence to support such optimism (23).

The present treatment has dealt with the descriptive question of how decisions are made rather than with the normative question of how they ought to be made. However, the descriptive principles of choice must have a role in the analysis of rationality. The lay meaning of rationality involves several elements. To be considered rational, an agent must know his (or her) interests and act to serve them. Furthermore, preferences should be internally consistent at any one time, and at least moderately stable over time. Modern decision theory, however, has focused exclusively on the criterion of consistency or coherence, which provides an operational test for rationality and avoids the treacherous problem of justifying values and beliefs. The assignment of utilities to outcomes, in this theory, is the sovereign prerogative of the decision maker; the rationality of coherent preferences cannot be questioned.

Utilities derived from preferences reflect the desirability of outcomes at the moment of decision. The common notion of rationality requires that the desirability of an outcome should represent a sensible prediction of the hedonic experience associated with its occurence (24). Thus, a man could be judged irrational either because his preferences are inconsistent, or because his desires and aversions do not reflect his pleasures and pains. The predictive criterion of rationality can also be invoked to assess the appropriateness of alternative outcome frames. For example, consider the question of whether people should evaluate monetary outcomes in terms of gains and losses, as they normally do, or whether they should be encouraged to frame outcomes in terms of total wealth, as recommended by decision analysts. Inclusive framing helps prevent inconsistencies, but restrictive framing can lead to better predictions of future welfare, if outcomes are actually experienced as gains and losses.

Some of the effects of outcome framing discussed in the preceding section could perhaps be justified by such an argument.

There are occasions in which the framing of a decision affects the actual experience of outcomes. For example, the practice of evaluating outcomes in terms of total wealth is likely to attenuate the emotional response to an occasional loss. Framing can also reflect the acceptance or rejection of responsibility for particular consequences. Deliberate manipulations of framing, which group events, label outcomes and assign responsibilities, are commonly used as an instrument of self-control (21). In such situations, the adoption of a decision frame is an ethically significant act.

The competing emphases, on the coherence of preferences and on the predictive accuracy of utilities, suggest different approaches to the task of improving the quality of decisions. The approach based on coherence encourages the decision maker to explore his (or her) preferences and to resolve inconsistencies, although it provides no guidance on how to do so. The predictive approach would encourage the decision maker to focus on future experience and ask "what will I feel then?" rather than "what do I want now?". The former question, when answered with care, is probably the more useful guide in difficult decisions.

In summary, we have presented evidence that the processes of framing and evaluation produce predictable but incoherent preferences. We have questioned the adequacy of coherence as the sole criterion of rationality, and have argued that a normative theory of choice must consider the psychological principles that govern the anticipation and the experience of pleasures and pains.

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fair coins, that one participant in ten would be selected at random to play the gambles or his or her choice, that the payoffs would be proportional to the total number of points accumulated, and that it was possible to win as much as $26. To ensure a positive return for the entire set, a third decision was included, between an even chance to win 800 or 1600 points and an even chance to win 1000 or 1400 points. These payoff conditions, which produced considerable involvement, did not alter the pattern of preferences observed in the hypothetical problem: 67% of respondents chose prospect A, and 86% chose prospect D. The dominated combination of A & D was chosen by 60% of respondents, and only 6% favored the dominant combination of B & C.

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25. This work was supported by the Office of Naval Research under Contract N00014-79-C-0077 to Stanford University.

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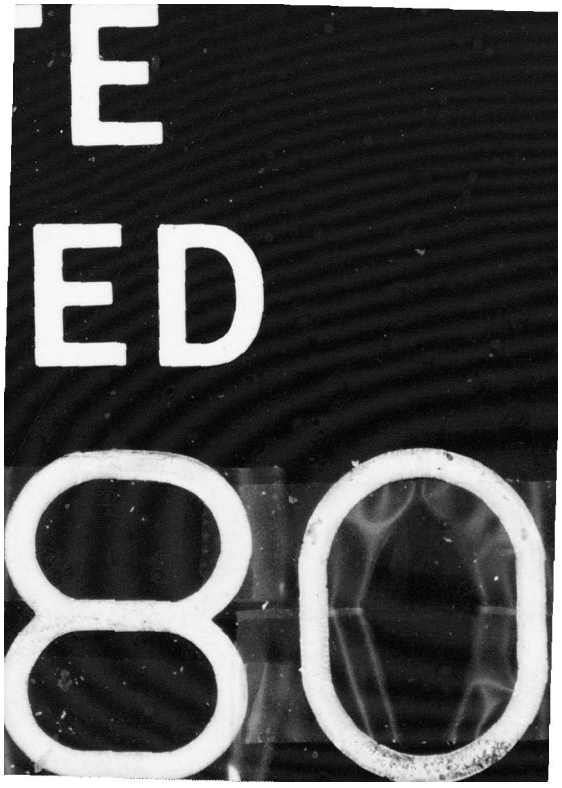
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